EFFECT OF CHICKEN MANURE AND PRESSED OLIVE CAKE ON GROWTH, PRODUCTIVITY AND WATER USE EFFICIENCY OF SWEET PEPPER (*CAPSICUM ANNUUM* L.) UNDER EL-ARISH CONDITIONS.

El-Kassas A.I[1] and A. A.El-Sebsy[2]

1- Plant production and protection department(Vegetables).
2- Soil and water department.
Faculty of Environmental Agricultural Sciences, El-Arish, Suez Canal University, Egypt.

ABSTRACT

Two experiments were carried out in both of plastic greenhouses and low plastic tunnels at the Experimental Farm of Environmental Agricultural Sciences Faculty at El-Arish, Suez Canal University, during the winter seasons of 1999/2000 and 2000/2001. Six organic manure treatments (chicken manure, pressed olive cake, chicken manure treated with urea, pressed olive cake treated with urea, chicken manure treated with ammonium hydroxide and pressed olive cake treated with ammonium hydroxide) were applied after composting for one month. Treating chicken manure or pressed olive cake with urea or ammonium hydroxide resulted in significant differences in vegetative growth parameters and produced the highest yields compared to untreated manures. High water use efficiency was obtained by compost treated, chicken manures or pressed olive cake manure by urea or ammonium hydroxide. So, the pressed olive cake can be used successfully as a manure fertilizer for producing sweet pepper plants.

INTRODUCTION

Sandy soil has its own problems as single grain structure, susceptibility to erosion, and low nutrient levels and low microbial activities (Nour, 1999). It's very poor in mineral nutrients and has low moisture holding capacity as well as scarce of organic matter. The use of organic soil amendments has been associated with desirable soil properties including high available water holding capacity and cation exchange capacity and lower bulk density and can foster beneficial microorganisms (Doran, 1995; Drinkwater et al., 1995). The use of recycle organic matter as alternative soil fertility amendments can result in increased organic matter and biological activity in soils. Alternative soil amendments can enhance soil compared with synthetic fertilizers and improve plant yield (Bulluck et al., 2002). It can also result in a higher quality soil and greater plant disease suppressivenss (Bulluck and Ristaino,2002). Clark et al (1998) found that concentrations of carbon, phosphorus, potassium, calcium, and magnesium were greater in soils with incorporated manures and cover crops, and soil carbon, phosphorus, and potassium declined after manure application ceased.

The cultivation and processing of olives for olive-oil production are the most important industries in mediterranean countries, where approximately 98% of the world's commercial olive trees are located. These industries generate large amounts of organic wastes as leaves, olive-oil mill waste water, and wet, semidry and dry olive cakes. The disposal of these wastes is regarded as a serious environmental issue in the major olive-growing regions(Tomati and Galli.,1995). Benitez et al. (2000) used dry olive cake as organic mulches in a greenhouse pepper(*Capsicum annuum*,L.) .They found that soil biochemical activities (dehydrogenase, urease and phosphatase) were promoted in pepper rhizosphere. The addition of dry olive cakes as organic mulche increased P concentration in pepper leaves from 1.5 to 4.5 – 5.7 $g.kg^{-1}$. Potassium concentration in leaves increeased from 51 to 65-85 $g.kg^{-1}$, depending on the mulch assayed. In contrast, N concentrations were unaffected. Rhizosphere dehydrogenase activity increased by 1.5 to 2.5 fold by the incorporation of mulches, either virmicomposted or not, when compared with the control. This suggests that microbial numbers and potential activity in the rhizosphere were related to the addition of organic materials. Urease activity in the rhizosphere was inhibited, at least threefold, when unprocessed products were used as organic mulches. This inhibitory effect disappeared, when unprocessed dry olive cakes were previously vermicomposted. Phosphatase activity was stimulated by the presence of organic mulches, especially if they were previously vermicomposted. They conclouded that dry olive cake should be vermicomposted prior to use as mulching media in horticultural crops.

In North Sinai, the prices of organic manures are expensive and are considered sources for infection by various diseases, insects and weeds. Therefore, the objective of the present work is to study the possibility of using pressed olive cacke as a local organic manure which is available in a low price and free from diseases and weeds for agricultural production.

MATERIALS AND METHODS

Field experiments were conducted in the winter seasons of 1999-2000 and 2000-2001 at the Experimental Farm of the Faculty of Environmental Agricultural Sciences Suez Canal University at El-Arish,. The basic soil properties and the chemical analysis of irrigation water are given in table (1a and 1b). Soil texture was sandy.

Six treatments, each replicated three times, were distributed in a randomized complete block design. They were:

1)- chicken manure.
2)- pressed olive cake.
3)- chicken manure treated with urea.

4)- pressed olive cake treated with urea.
5)- chicken manure treated with ammonium hydroxide(NH4OH).
6)- pressed olive cake treated with ammonium hydroxide(NH4OH).

Table (1a): Initial soil mechanical and chemical analysis.

Soil properties	Seasons							
	1999-2000				2000-2001			
	Depth(cm.)							
	0-15	15-30	30-45	45-60	0-15	15-30	30-45	45-60
Mechanical analysis								
Coarse sand %	68.00	65.60	64.50	65.70	67.99	65.64	64.54	65.73
Fine sand %	20.60	22.90	25.20	25.20	20.55	22.88	25.15	25.17
Silt %	3.50	3.80	3.20	1.80	3.52	3.83	3.18	1.84
Clay %	7.90	7.70	7.10	7.30	7.94	7.65	7.13	7.26
Soil texture	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy
Bulk density ($g.cm^{-3}$)	1.53	1.52	1.56	1.53	1.53	1.52	1.56	1.53
Particle density ($g.cm^{-3}$)	2.49	2.49	2.66	2.66	2.49	2.49	2.66	2.66
Chemical analysis (soluble ions in (1:5) extract)								
Ca^{++} ($meq.l^{-1}$)	3.03	3.03	3.03	2.01	2.10	2.30	2.00	1.90
Mg^{++} ($meq.l^{-1}$)	2.11	2.57	2.02	1.38	2.2	2.4	1.95	1.42
Na^{+} ($meq.l^{-1}$)	1.18	1.14	0.75	0.86	4.49	3.56	3.49	2.07
K^{+} ($meq.l^{-1}$)	0.48	0.36	0.30	0.34	0.31	0.24	0.26	0.21
CO_3^{--} ($meq.l^{-1}$)	-	-	-	-	-	-	-	-
HCO_3^{-} ($meq.l^{-1}$)	2.00	2.30	2.50	2.60	2.40	2.60	2.90	2.50
Cl^{-} ($meq.l^{-1}$)	1.02	1.70	1.65	1.61	2.30	2.40	2.10	1.70
SO_4^{--} ($meq.l^{-1}$)	3.78	3.10	1.95	0.38	4.40	3.50	2.70	1.40
EC($dS\ m^{-1}$) in (1:5) extract)	0.68	0.72	0.61	0.46	0.91	0.85	0.77	0.56
PH in (1:2.5) extract)	8.10	8.30	8.50	8.70	8.20	8.40	8.30	8.50
Organic matter %	0.16	0.14	0.12	0.10	0.21	0.195	0.16	0.12
$CaCO_3$ %	3.95	4.67	4.15	4.03	3.95	4.65	4.16	4.21

Table (1b): Chemical analysis of irrigation water.

PH	EC		Soluble ions ($meq.l^{-1}$)							
	dSm^{-1}	ppm	Cations				Anions			
			Ca^{++}	Mg^{++}	Na^{+}	K^{+}	Cl^{-}	HCO_3^{-}	CO_3^{--}	SO_4^{--}
6.7	5.65	3616	18.12	20.20	17.72	0.25	38.40	6.25	-	11.64

Urea and ammonium hydroxide were added at the rate of 250 $g.m^{-3}$ and mixed carefully during wetting the mixture, then the manures were covered with plastic. They were remixed again after 20 days and were used 10 days later. The organic manure treatments were carried out in tow experiments: under plastic greenhouse (8.5 x 60 m) and under low plastic tunnels. The amount added from each treatment was calculated on the basis of adding 6 m^3 manure to the plastic greenhouse and 20 m^3 manure per feddan(4200m^2)for the low plastic tunnels.

Sweet pepper seedlings *cv.* Sonar were transplanted at the age of four true leaves on 30th October in both seasons after one week of applying the organic matters. Under plastic greenhouse, planting was done in five double rows. Planting density was 2.35 plant m^{-2}. Plot area was 17 m^2 (1.7 X 10 m). Under low plastic tunnels, planting was done in a single row, 50 cm between plants in the same row and 1.8 m between rows. Plot area was 18 m^2(1.8 x10m).

Chemical fertigation was done through drip irrigation system according to the common recommendations. Other cultural practices were applied also according to recommendations. Samples were taken from each organic manure after composting and at the end of the experiment for chemical analysis (Table 2).Three plants were randomly uprooted from each plot after 115 days from transplanting to study the effect of treatments on some vegetative traits, i.e. plant height, No.of leaves per plant, fresh and dry weights of plant, root, stem and leaves. Fruit yield and quality were determined as follow:

a)- total fruit yield ($kg.m^{-2}$).
b)- fruit dimensions [fruit length (L)cm , diameter (D)cm and L/D].
c)- fruit wall thickness (cm) and
d)- vitamin C content of mature green fruits.

Water use efficiency (W.U.E.):

The consumed water by sweet pepper was calculated according to Yaron et al., 1973, as follow:

$$W.U.E = \frac{Y}{ET_c}$$

Where:

Y = Seasonal yield ($kg.fed^{-1}$.).
ETc = Evapotranspiration ($m^3.fed^{-1}$.).

Data were tested by analysis of variance, Duncan's Multiple range test was used for comparison among the treatment means, Duncan, 1955.

RESULTS AND DISCUSSION

Chemical analysis of manure treatments:

Nitrogen immoblization and mineralization of organic nitrogen in the soil is opposite in effect. The net rate of release of inorganic nitrogen from these two processes is of out standing importance for crop nutrition. Data in table (2) indicate that the efficiency of nutrients absorption should be positively affected by composting organic manures. The reason for such absorption is based on the expected chemical changes in the soil. Nitrogen

Table (2): Chemical analysis of manure treatments before applying to the soil and at the end of the experiments.

Treatments	Org. matter (%)	Org. Carbon (%)	C/N	N (%)	P (%)	K (%)	Cu (ppm)	Zn (ppm)	Mn (ppm)	Fe (ppm)
	Before applying to the soil									
Chicken manure	36.60	21.23	15.06	1.41	3.34	7.50	88.40	398.10	724.80	2669
Pressed olive cake	49.67	28.81	6.58	4.38	0.22	7.30	11.60	31.30	21.70	559
Chicken manure + urea	27.88	16.17	9.92	1.63	3.84	8.50	103.70	424.90	333.10	3434
Pressed olive cake + urea	40.37	23.42	9.01	2.60	0.09	1.60	8.00	33.30	41.00	2139
Chicken manure + ammonium	19.17	11.17	8.59	1.30	2.84	6.80	70.40	387.40	292.40	3514
Pressed olive cake+ammonium	42.12	24.43	8.66	2.82	0.11	2.90	9.00	29.50	28.90	1734
	At the end of the experiments									
Chicken manure	40.26	23.35	14.41	1.62	3.67	8.25	97.24	437.91	797.28	2936
Pressed olive cake	54.65	31.70	6.29	5.04	0.24	8.03	12.76	34.43	23.87	615.0
Chicken manure + urea	30.67	17.79	9.51	1.87	4.42	9.78	119.26	488.64	385.07	3949
Pressed olive cake + urea	44.31	25.70	8.59	2.99	0.10	1.84	9.20	38.30	47.15	2460
Chicken manure + ammonium	21.21	12.30	8.2	1.50	3.27	7.82	80.96	445.50	336.26	4041
Pressed olive cake+ammonium	45.57	26.43	8.16	3.24	0.13	3.34	10.35	33.93	33.24	1994

percentage was increased due to composting, this led to decrease C/N ratio, which led to nitrogen mineralization. Data also show that composting organic manures increased P percentage , this is due to that humus not only stores nutrients but it also makes several nutrients more available for plant use. As organic matter decays, it releases mild acids, called humic acids, which dissolve soil minerals, freeing them for plant use. Phosphorus in the soil tends to form compounds that do not dissolve in water, these forms nither move in the soil nor can plant roots absorb them. Humic acid acts on these compounds making soluble phosphorus that moves in the soil in a form that plant can use. Similar results were reported by Edward, 1990. Data also show clear increase in some micronutrients,i.e., Cu,Zn,Mn and Fe. This is due to that some nutrient such as the metal iron and Zn react with other soil chemicals to form insoluble compounds. Certain humus molecules form a ring around the metal atom in a process called chelation(Key-lay-shun). These chelates protect the metal atoms from being locked in the soil. In this way organic matter helps keep iron,Zn and some other nutrients water soluble and available to plants. Similar results were recorded by Edward,1990. This lead to increasing root distribution and promoting plant growth. Sakar et al.,1992 reported that adding urea to organic manures increased NPK concentrations in wheat and maize plants. Mallangouda et al. (1995) found that application of the recommended dose of NPK to farmyard manure (FYM) improved the growth parameters as well as yields of *Cspsicum annuum*. Abou El-Naga et al, (1996) reported that organic manure (FYM) encouraged biological activity in soil. Availability of N, P, K, Mn, and Zn increased with increasing application rates of organic manure.

Vegetative growth characters:

Data presented in table (3) show that treating the applied manure with urea or ammonium affected all studied parameters, yet there were no significant differences among all their treatments. Moreover, there were no differences between the untreated manures in most of the studied parameters in both seasons.This may be due to that C/N ratio for all treatments were less than 16:1, that cases mineralization of most nutrients. Also, Data in Table (4) show that composted organic manures resulted in higher dry weight under greenhouse and low plastic tunnels.

It is clearly evident from such results that pressed olive cake as an organic manure fertilizer can replace chicken manure. In addition, treating pressed olive cake or chicken manure with urea or ammonium and composting them resulted in a stimulative effect on plant growth, This is most likely due to the well-known capacity of the wastes from olive-oil

Table (3) : Effect of organic manure treatments on sweet pepper plant height, number of leaves per plant and plants fresh weights.

treatments	Greenhouse experiment*						Low plastic tunnels experiment*					
	Plant height (cm)	No. of leaves per plant	Plant fresh weight (gm)				Plant height (cm)	No. of leaves per plant	Plant fresh weight (gm)			
			Root	Stem	Leaves	Total			Root	Stem	Leaves	Total
First season 1999-2000												
Chicken manure	53.63 b	112.90 bc	36.47 d	100.30 c	137.20 c	273.97 c	40.80 a	60.40 b	33.87 a	79.87 b	118.30 d	232.04 d
Pressed olive cake	60.03 ab	109.80 c	38.30 cd	110.40 b	146.70 b	295.40 b	40.17 a	64.83 b	34.20 a	82.23 ab	132.80 c	249.23 c
Chicken manure + urea	64.87 a	116.60 ab	43.27 ab	116.40 a	166.20 a	325.87 a	42.93 a	72.73 a	35.73 a	87.93 a	140.40 b	264.06 b
Pressed olive cake + urea	62.30 ab	117.20 a	40.97 bc	116.30 a	167.30 a	324.57 a	42.83 a	73.07 a	35.07 a	85.53 ab	150.20 a	273.80 a
Chicken manure + ammonium	60.23 ab	116.00 ab	46.33 a	113.70 ab	162.80 a	322.83 a	41.43 a	73.43 a	35.37 a	87.30 a	155.20 a	277.87 a
Pressed olive cake+ammonium	60.97 ab	117.40 a	44.60 ab	116.50 a	165.20 a	326.30 a	42.80 a	72.70 a	34.07 a	86.63 a	152.40 a	273.10 a
Second season 2000-2001												
Chicken manure	50.37 c	107.00 bc	37.07 bc	94.60 b	136.00 b	267.67 b	38.57 c	61.07 d	31.30 a	79.00 b	115.00 d	225.30 c
Pressed olive cake	53.20 b	104.10 c	34.93 c	96.27 b	137.10 b	268.30 b	39.87 bc	62.53 c	31.70 a	79.03 b	115.50 d	226.23 c
Chicken manure + urea	66.50 a	112.50 ab	40.67 ab	109.40 a	157.70 a	307.77 a	41.47 ab	68.53 b	34.07 a	84.67 a	122.30 c	24104 b
Pressed olive cake + urea	56.23 a	118.10 a	41.33 ab	111.00 a	160.30 a	312.63 a	42.87 a	68.33 b	32.97 a	85.57 a	126.10 b	244.64 ab
Chicken manure + ammonium	56.70 a	113.90 a	42.33 a	109.30 a	161.50 a	313.13 a	41.67 ab	68.33 b	33.53 a	85.20 a	133.40 a	252.13 a
Pressed olive cake+ammonium	56.77 a	112.90 ab	43.10 a	110.70 a	162.40 a	316.20 a	41.40 ab	68.97 a	33.63 a	83.30 ab	132.90 a	249.83 a

*Values having the same alphabetical letter within each column is not significantly different at the 0.05 level, according to Duncan's multiple range test.

Table (4) : Effect of organic manure treatments on sweet pepper dry weight.

treatments	Greenhouse experiment*				Low plastic tunnels experiment*			
	Plant dry weight (gm)				Plant dry weight (gm)			
	Root	Stem	Leaves	Total	Root	Stem	Leaves	Total
First season 1999-2000								
Chicken manure	8.13 d	15.13 b	18.80 b	42.06 d	12.80 b	20.33 b	27.00 a	60.13 a
Pressed olive cake	8.16 d	15.23 b	21.73 a	45.12 c	11.93 b	21.46 ab	28.93 a	62.32 a
Chicken manure + urea	12.57 bc	17.03 a	21.53 a	51.13 ab	16.70 a	21.23 ab	28.07 a	66.00 a
Pressed olive cake + urea	12.13 c	17.63 a	21.10 a	50.86 b	15.60 a	22.26 ab	27.10 a	64.96 a
Chicken manure + ammonium	13.90 a	17.80 a	21.63 a	53.33 a	16.50 a	22.83 a	28.20 a	67.53 a
Pressed olive cake+ammonium	13.57 ab	17.60 a	21.00 a	52.17 ab	16.43 a	23.33 a	27.73 a	67.49 a
Second season 2000-2001								
Chicken manure	7.97 a	14.30 a	16.07 c	38.34 d	11.23 b	18.77 c	24.10 b	54.10 b
Pressed olive cake	8.07 a	14.07 a	17.37 b	39.51 c	10.97 b	19.30 bc	23.87 b	54.14 b
Chicken manure + urea	11.03 a	16.03 a	20.00 a	47.06 b	13.97 a	20.97 ab	27.37 a	62.31 a
Pressed olive cake + urea	11.17 a	16.47 a	19.73 a	47.37 ab	14.07 a	21.90 a	27.03 a	63.00 a
Chicken manure + ammonium	11.43 a	16.57 a	20.03 a	48.03 ab	14.77 a	21.47 a	26.47 a	62.71 a
Pressed olive cake+ammonium	11.47 a	16.73 a	20.03 a	48.23 a	14.77 a	21.90 a	26.80 a	63.47 a

* Values having the same alphabetical letter within each column is not significantly different at the 0.05 level, according to Duncan's multiple range test.

industries to release P and especially K. In this respict Gallardo-Lara et al. (1995) reported an increase in available K to ryegrass (*Lollium perenne*, L.) and exchangeable K in soil following the application of olive wastes.

Garcia et al. (1994) reported that there were evidence that urease activity in soils can be increased by the addition of organic materials that promote microbial activity. Benitez et al. (2000) suggested that rhizosphere dehydrogenase activity increased by 1.5 to 2.5 fold by incorporating olive cakes either vermicomposted or not, when compared with the control. This result led to the suggestion that microbial numbers and potential activity in the rhizosphere were related to the addition of organic materials. They added that urease activity in the rhizosphere was inhibited, at least three-fold, when unprocessed products were used as organic mulches, but this inhibitory effect disappeared when processed dry olive cakes were previously vermicomposted. This inhibitory effect could be due to the presence of polyphenols in these substrates, which have been reported to inhibit urease activity (Mulvaney and Bremmer, 1981).

Generally, organic amendments increase soil phosphatase activity over unamended soils due to the stimulation of the microbial activity of the soil rather than to the direct addition of enzymes from the organic sources (Dick et al, 1988; Martens et al, 1992). Benitez et al. (2000) reported that phosphatase activity was stimulated by the presence of organic olive cake, especially if it was previously vermicomposted.

Fruit yield and quality:

Data in table (5) show that the addition of composted organic manures resulted in higher yields compared with uncomposted treatments. Also, using composted organic manures improved fruit characteristics. The enhancing effect of composted organic manures in this concern may be due to the promoting effects of composted manures on soil biochemical activities which reflected on the vegetative growth of pepper plants and their yield and its quality.

Such enhancement in plant growth could be attributed to various mechanisms, such as: changes in partial water availability, increased availability of macro and miconutrients, stimulations of microbial activity, augmentation of critical enzymes activities, or production of plant growth promoting materials. (Tyler et al, 1993; De Brito Alvarez et al., 1995; Beeson, 1996; Serra-Wittling et al., 1996; Marinari et al., 2000). Therefore, composts can affect bedding plant growth by modifying the physicochemical and microbiological characteristics of the plant growth medium beneficially.

Table (5) : Effect of manure treatments on yield and fruit quality of sweet pepper.

Treatments	Greenhouse experiment*						Low plastic tunnels experiment*					
	Total yield (m^2)	Fruit dimensions			Fruit wall thickness (cm)	V.C. (mg/100 g)	Total yield (m^2)	Fruit dimensions			Fruit wall thickness (cm)	V.C. (mg/100g)
		Fruit length (cm)	Fruit diameter (cm)	L/D				Fruit length (cm)	Fruit diameter (cm)	L/D		
First season 1999-2000												
Chicken manure	4.83 a	11.30 c	7.56 a	1.49 a	0.31 d	118.30 c	3.23 b	12.83 c	7.61 a	1.69 c	0.42 c	140.00 b
Pressed olive cake	4.80 a	12.25 abc	7.01 f	1.73 a	0.39 ab	129.30 c	3.27 b	14.46 b	7.03 c	2.06 a	0.55 a	142.70 b
Chicken manure + urea	5.27 a	12.40 ab	7.30 c	2.11 a	0.37 b	158.30 a	4.30 a	11.53 f	7.40 ab	1.56 c	0.47 bc	161.70 a
Pressed olive cake + urea	5.10 a	12.00 bc	7.25 d	1.66 a	0.42 a	149.70 b	4.27 a	12.21 e	7.33 abc	1.67 bc	0.46 c	168.30 a
Chicken manure + ammonium	4.97 a	13.00 a	7.39 b	1.76 a	0.40 a	147.70 b	4.23 a	14.77 a	7.46 ab	1.98 ab	0.51 ab	167.00 a
Pressed olive cake+ammonium	5.17 a	12.83 ab	7.15 e	2.79 a	0.35 c	145.00 b	4.27 a	12.31 d	7.22 bc	1.70 bc	0.50 abc	168.00 a
Second season 2000-2001												
Chicken manure	4.23 b	11.48 c	7.60 a	1.51 a	0.34 d	132.70 c	3.23 b	12.87 c	7.60 a	1.69b c	0.43 c	147.30 d
Pressed olive cake	4.33 b	12.44 abc	7.00 f	1.77 a	0.41 ab	136.00 c	3.13 b	14.50 b	7.00 c	2.07 a	0.54 a	146.30 d
Chicken manure + urea	5.07 a	12.61 ab	7.37 c	1.71 a	0.39 b	157.70 a	4.13 a	11.57 f	7.37 ab	1.57 c	0.47 bc	154.70 c
Pressed olive cake + urea	5.00 a	12.04 bc	7.30 d	1.65 a	0.43 a	149.30 b	4.10 a	12.20 e	7.30 abc	1.67 bc	0.45 c	158.00 b
Chicken manure + ammonium	4.93 a	13.20 a	7.47 b	1.76 a	0.42 a	145.00 b	4.07 a	14.80 a	7.47 ab	1.98 ab	0.52 ab	163.30 a
Pressed olive cake+ammonium	4.97 a	12.88 ab	7.20 e	1.79 a	0.36 c	149.30 b	4.17 a	12.33 d	7.20 bc	1.71 bc	0.51 abc	165.70 a

*) Values having the same alphabetical letter within each column is not significantly different at the 0.05 level, according to Duncan's multiple range test.

Water use efficiency:-

Data given in table (6) show that the highest water use efficiency was found for all composted organic manures. Therefore, plants treated with composted manures exhibited the highest benefit of the applied water. These results agree with those reported by Selvaraj et al. (1998).

Table(6):Effect of organic manure treatments on sweet pepper water use efficiency

Treatments	Water use efficiency ($kg.m^{-3}$)	
	Greenhouse experiment*	Low tunnels experiment*
First season 1999-2000		
Chicken manure	6.060 a	4.053 b
Pressed olive cake	6.020 a	4.097 b
Chicken manure + urea	6.270 a	5.393 a
Pressed olive cake + urea	6.390 a	5.350 a
Chicken manure + ammonium	6.227 a	5.310 a
Pressed olive cake + ammonium	6.477 a	5.350 a
Second season 2000-2001		
Chicken manure	5.030 b	3.840 b
Pressed olive cake	5.150 b	3.720 b
Chicken manure + urea	6.020 a	4.893 a
Pressed olive cake + urea	5.940 a	4.870 a
Chicken manure + ammonium	5.860 a	4.830 a
Pressed olive cake + ammonium	5.900 a	4.937 a

*Values having the same alphabetical letter within each column is not significantly different at the 0.05 level, according to Duncan's multiple range test

REFERENCES

Abou- El-Naga, S.A.; M.S. Omran; A.M. Shehata, 1996. The combined effect of organic manure (FYM) and irrigation regime on the biological activity and nutrients availability in green pepper. Egyptian Journal of soil science. 36, 1-4, 33-45; 24ref.

Beeson Jr, R.C., 1996. Composted yard waste as a component of container substrates. Journal of environmental Horticulture 14, 115-121.

Benitez, E.; R. Melgar; H. Sainz; M. Gomez; R. Nogales.2000. Enzyme activities in the rhizosphere of pepper *(Capsicum annuum*, L.)grown with olive cake mulches.Soil Biology and Biochemistry32,1829-1835.

Bulluck L.R., M. Brosius; G.K. Evanylo; J.B. Ristaino. 2002. Organic and synthetic fertility amendments influence soil microbial, physical and chemical properties on organic and conventional farms. Applied Soil Ecology 19,147-160.

Bulluck, L.R., and J.B. Ristaino, 2002. Synthetic and organic amendments affect southern blight, soil microbial communities and yield of processing tomatoes. Phytopathology 92 in press.

Clark, M.S.; W.R. Horwath; C. Shennan; K.M. Scow, 1998. Changes in soil chemical properties resulting from organic and low input farming practices. Agron.J.90, 662-671.

De Brito Alvarez, M.A.; S. Gagne; H. Antoun, 1995. Effect of compost on rhizosphere microflora of the tomato and on the incidence of plant-growth promoting rhizobacteria. Applied and Environmental Microbiology 61,194-199.

Dick, R.P.; P.E. Rasmussen; E.A. Kerle, 1988. Influence of long-term residue management on soil enzyme activity in relation to soil chemical properties of a wheat-fallow system. Biology and fertility of soils 6,159- 164.

Doran, J., 1995. Building soil quality. In: proceedings of the 1995 conservation Workshop on Opportunities and Challenges in sustainable Agriculture. Red Deer., Canada, Alberta Conservation, Development Branch, pp.151-158.

Drinkwater, L.E.; D.K. Letourneau; F. Workneh; A.H.C. van Bruggen; C.Shennan, 1995. Fundamental differences between conventional and organic tomato agroecosystems in California.Ecol.Appl. 5,1098-1112.

Duncan, D.B., 1955. Multiple range and multiple F.test. Biometrics 11: 1-42.

Edward J. Plaster, 1990. Soil Science & Management 2nd (ed.). Chapter eight (O.M.),173:193, chapter fourteen (organic mendments), 320: 339.

Gallardo-Lara, F.; J.L. Quesada; M. Azcon; J.D. Perez, 1995. Dynamics of potassium fraction in the soil-plant system after the application of an acid potassium-rich effluent. Toxicological and Environmental Chemistry 48,49-57.

Garcia, C.; M.T. Hemandez; F. Costa; B. Ceccanti, 1994. Biochemical parameters in soils regenerated by addition of organic wastes. Waste Management and Research 12, 457-466.

Mallangouda B.; G.S. Sulikeri; B.G. Murthy; N.C. Prathbiha, 1995. Effect of NPK FYM and companion crops on growth, yield and yield components of chilli (*Capsicum annuum* L.). Advances-in Agricultural-Research-in India. 3, 58-69; 3 ref.

Marinari, S.; G. Masciandaro; B. Ceccanti; S. Grego, 2000. Influence of organic and mineral fertilizers on soil biological and physical properties. Bioresource Technology 72, 9-17.

Martens, D.A., J.B. Johanson; W.T. Frankerberger Jr., 1992. Production and persistence of soil enzymes with repeated additions of organic residues. Soil Science 153, 53-61.

Mulvaney, R.L. and J.M. Bremmer., 1981. Control of urea transformation in soils. In: Paul, E.A., fadd, JN. (Eds.). Soil Biochemistry, vol 5. Marcel Dekker, New York, pp: 153-196.

Nour, E.M.E., 1999. Effect of some agricultural treatments on pea under sandy soil conditions. M.Sc. Thesis, Zagazig University, Egypt.

Sakar A.A.; S.A. Rizk and A.S. El-Sebaay., 1992. Effect of organic manures on plant growth and NPK uptak by wheat and maize plants. Egypt. J. Soil Sci. 32: 244-363.

Selvaraj-KV; I.M. Iqbal; M.S. Dawood; S.M. Krishnasamy;V. Muraledharan; M.S. Hariharan; A.K. Sadanandan (ed.); K.S. Krishnamurthy (ed.); K. Kandiannan (ed.); VS. Korikanthimath, 1998. Irrigation management under differential moisture regime for chilli crop (*Capsicum annuum*). Proceedings of the national seminar, Modikeri, Karnataka, India, 5-6 October 1997-1998, 161-163. Indian Society for Spices; Calicut; India.

Serra-Wittling, C.; S. Houot; E. Barriuso, 1996. Modification of soil water retention and biological properties by municipal solid waste compost. Compost science and Utiliztion 4, 44-52.

Tomati, U.; Galli, E.,1995. Earthworms, soil fertility and plant productivity. Acta Zoologica Fennica 196, 11-14.

Tyler, H.H.; S.L. Warren; T.E. Bilderback; W.C., Fonteno, 1993. Composted Turkey litter: I. Effect on chemical and physical properties of a pine bark substrate. Journal of Environmental Horticulture 11, 131-136.

Yron, B.; E. Danfors, and Y. Vaddia, 1973. Arid zone irrigation. Springer-Verlag Berlin, Heidelberg, New York.

الملخص العربي

تأثير مخلفات الدواجن ومخلفات عصر الزيتون على نمو وإنتاجية وكفاءة استخدام المياه لمحصول الفلفل الحلو تحت ظروف العريش.

علي إبراهيم القصاص[1] و عطيه عبد الوهاب السبسي[2]

١- قسم الإنتاج النباتي ووقايته(خضر) ، ٢- قسم الأراضي والمياه
كلية العلوم الزراعية البيئية بالعريش-جامعة قناة السويس

أجريت تجربتان في كل من الصوب البلاستيكية والأنفاق البلاستيكية المنخفضة بالمزرعة التجريبية لكلية العلوم الزراعية البيئية بالعريش جامعة قناة السويس خلال الموسم الشتوي ١٩٩٩/٢٠٠٠و٢٠٠٠/٢٠٠١م . استخدمت ستة معاملات للتسميد العضوي هي: مخلفات الدواجن – مخلفات عصر الزيتون- مخلفات الدواجن المعاملة باليوريا- مخلفات عصر الزيتون المعاملة باليوريا- مخلفات الدواجن المعاملة بهيدروكسيد الأمونيوم- مخلفات عصر الزيتون المعاملة بهيدروكسيد الأمونيوم وذلك بعد كمرها لمدة شهر.

أدت معاملة مخلفات الدواجن أو مخلفات عصر الزيتون باليوريا أو بهيدروكسيد الأمونيوم إلى إحداث اختلافات معنوية في مختلف مقاييس النمو وأعطت أعلى قيم للمحصول بالمقارنة بالمخلفات التي لم تعامل. كذلك أدت المعاملة باليوريا أو بهيدروكسيد الأمونيوم لمخلفات الدواجن أو مخلفات عصر الزيتون إلى زيادة كفاءة استخدام المياه . ولهذا فإنه يمكن استخدام مخلفات عصر الزيتون بنجاح كمصدر للتسميد العضوي لإنتاج الفلفل الحلو.